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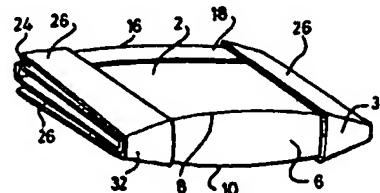
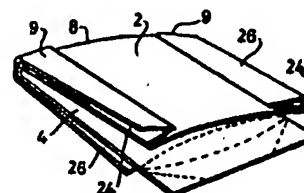
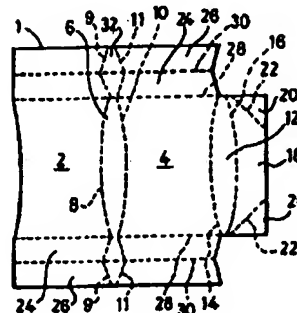
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B65D 5/18, 65/46, 81/17		A1	(11) International Publication Number: WO 98/01349 (43) International Publication Date: 15 January 1998 (15.01.98)
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(54) Title: **CARDBOARD CONTAINER FOR A WATER SOLUBLE BAG**

(57) Abstract

It has for some years been proposed to package chemicals such as herbicides and pesticides in a flexible pouch which is made of a water soluble material such as PVOH. The pouch is disposed within a flexible water-protective bag, and the bag is then given an outer holder, commonly of corrugated board or the like, to provide additional strength and some protection against the likely ambient conditions. Such a triple-layer package is easy and safe to use, but has some disadvantages, namely that the present outer holder does not seem to hold the bag properly, so that if the bag-disposed pouch becomes brittle it is too easily susceptible to damage from mechanical shock. The present invention proposes a solution to this, in which the pouch/bag combination is given an outer holder of a novel form which provides significantly enhanced protection against shock. More specifically the invention suggests the use, as the outer portion of the three-layer package, of a pillow-shaped open-ended sleeve-like holder made from a suitably-shaped and -cut blank (1) that has been folded in such a way as to grip the bag securely and also preferably to provide the holder with cuff-like strengthening and shock-absorbing members (24, 26) around the two end edges of the sleeve. The sleeve is kept closed by a closure flap (18) the corners (20) of which are conveniently inserted into the space between the cuff members (24, 26) and part of the sleeve body (4).



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CARDBOARD CONTAINER FOR A WATER SOLUBLE BAG

This invention relates to blanks for containers, and concerns in particular a blank and a sleeve-like container made therefrom that is suitable for use as part of a containerisation system that may be of value in, for example, the packaging of fluids - especially gels and liquids - contained within a plastic bag, particularly such a bag in the form of a water-soluble envelope.

It has for some years been proposed that a very convenient way to market, transport and use possibly hazardous chemicals such as herbicides, pesticides and like agricultural substances that are to be dispersed in water prior to their use is in the form of a flexible package or pouch made of a material - the primary packaging material - which itself is water soluble. The pouch is then placed in a secondary package - a water-protective bag - to prevent the pouch being damaged if the whole is wetted by accident (as it might be were it to be exposed to rain or a high ambient humidity), and the bag is conveniently given a handle and a tear nick or strip so that it may easily be grasped and then opened by hand without using cutting tools.

For storage and/or transportation, one or more of such pouch/bag combinations are typically retained within an outer shipping carton, commonly of corrugated fibreboard or the like, that is either roughly the right size to hold the one (or more) pouch/bag combination or is partitioned (rather like a wine box) to keep each pouch/bag relatively secure, and to provide additional

strength and some protection against puncturing or tearing.

Such a containerisation system - water-soluble pouch as the primary package, water-protective bag as the secondary package, and outer shipping carton - is well-known in the Art; various examples of it are described in Rhône-Poulenc (Gee) US Patent No: 5,405,013 and in Rhône-Poulenc (Knudsen) EP Published Patent Specification No: 0,631,947A.

A double-layer package like the pouch/bag combination is easy and safe to use. The Operator simply takes the combination out of the shipping carton, tears open the protective bag, and without opening - or even touching - the inner pouch simply tips it into an appropriate quantity of water, whereupon the water-soluble primary packaging material dissolves and the contents of the pouch disperse as required. The Operator is not exposed to the pouch's possibly hazardous contents, and the risk of accidental spillage is reduced.

Typical flexible water-soluble packaging materials useful as the primary packaging - the pouch - are the various films made from polyvinyl alcohol (PVOH), while typical protective materials useful as the secondary packaging - the bag - are nylon/polyethylene laminates. Many other possible materials are described in the aforementioned US and European Patent Specifications.

PVOH (and other) films can if properly used make excellent water-soluble pouches for all sorts of fluids. Unfortunately, though, the pouches can become susceptible to damage due to mechanical shock, despite their enclosing protective bag. It is too easy for a severe impact to take the water-soluble pouch material beyond its elastic limit, causing rupture typically

around the seal area of the pouch. Moreover, such materials have flexibility and like characteristics which are, regrettably, deleteriously affected by temperature changes. Thus, at temperatures of around 0°C and below PVOH and similar films become increasingly brittle, to the point at which they can fail. The problem will be better understood from the following comments.

A PVOH primary packaging pouch containing a liquid or gel, whether in its protective secondary packaging bag or not, is somewhat shapeless, and left to itself will "flow" into the lowest mechanical energy shape it can. On a flat surface this is usually lying flat on the surface; if restrained within a larger container such as a shipping carton it may slump over, creasing as it goes.

If such a pouch is simply dropped from a metre (about 3ft) or more onto a hard surface it will almost inevitably burst; the impact subjects the pouch and its contents to considerable hydraulic pressure, and the forces involved can easily stretch the PVOH material beyond its elastic limit. This is particularly so at temperatures of 0°C or below, when the PVOH becomes less and less flexible. The situation is worsened if, as is most likely, the flexible PVOH film has wrinkled or creased (a typical occurrence when the pouch/bag combination is stored in a shipping carton).

The present invention seeks a solution to this, so as to reduce significantly the risks associated with stress cracking of the water-soluble film used to make the primary packaging pouch. In particular, the present invention proposes a way of mitigating, in part if not in whole, the issue of cold temperature transportation of water-soluble pouch packaging - especially that

containing hazardous chemicals such as pesticides and herbicides, in both liquid and gel presentations. Moreover, whilst the invention was conceived with the transport of hazardous chemicals in mind, other products susceptible to shock could equally utilise its principles. What the invention proposes is a containerisation system which allows for protection of the product against mechanical shock, puncture and cold climate temperature fluctuations. It also puts forward a stand-alone containerisation system which allows for protection of the product.

To achieve these aims the invention suggests the use of a novel construction of outer, storage-box, container, or holder, in which may be placed the pouch/bag combination, and that will provide the thus-placed pouch/bag combination with the required ability to withstand and be cushioned against the likely physical shocks associated with normal conditions of transport, storage and use. More specifically, the invention suggests the use, as this holder, of an open-ended sleeve-like receptacle made from a suitably-shaped and -cut blank that has been folded in such a way as to wrap around, and more securely to hold, a pouch/bag combination placed therein; this is accomplished by making the holder in a curvilinear shape like that of a pillow, which shape corresponds more or less to the natural "relaxed" shape of the pouch/bag combination to be disposed therewith. Such a pillow-shaped holder can be achieved by the use of a blank (from which the holder is to be constructed by folding and the like) wherein the fold lines defining the side and end walls of the portion are arcuate, such that as the blank is folded into its erect form it naturally takes on the required pillow shape.

In a highly preferred form of the sleeve-like holder the blank is also given edge strips that can be used to provide the holder with cuff-like strengthening and shock-absorbing members around the two end edges of the sleeve, and the holder is kept closed by a closure flap the corners of which are inserted into the space between the cuff members and part of the sleeve body.

In one aspect, therefore, the invention provides a blank from which may be formed a protective holder, the blank being made of shape-retaining material and comprising a central section having panels defining first and second opposed side walls of the container, with, spaced therebetween by first and second fold lines, an end wall of the container, and a closure flap projecting beyond the second side wall-defining panel and spaced therefrom by another fold line, the first and second fold lines, and said other fold line, all being arcuate, such that the end wall and the closure flap are generally correspondingly elliptical, which blank may be folded into a roughly pillow-shaped holder-forming configuration.

Very preferably, the blank also has first and second reinforcing strips extending along the edges of the blank in register with the first and second side wall-defining panels and with the end wall-defining panel, such that the blank may be folded into a holder-forming configuration wherein each reinforcing strip is folded over into contact with the exterior of the first and second side wall-defining panels and of the end wall-defining panel, and at one end of each reinforcing

strip the reinforcing strip and the first side wall-defining panel define together a slot to receive a respective corner of the closure flap.

In a second aspect the invention provides a protective holder made from a blank of the invention, and thus being a folded blank of shape-retaining material comprising

a central section having panels defining first and second opposed side walls of the container, with, spaced therebetween by first and second arcuate fold lines, an end wall-defining panel, and a closure flap projecting beyond the second side wall-defining panel and separated therefrom by another arcuate fold line,

which blank may be folded into a roughly pillow-shaped holder-forming configuration.

Again, very preferably the blank has first and second reinforcing strips extending along the edges of the blank in register with the first and second side wall-defining panels and with the end wall-defining panel, and in its folded configuration (making the holder) each reinforcing strip is folded over into contact with the exterior of the first and second side wall-defining panels and of the end wall-defining panel, and at one end of each reinforcing strip the reinforcing strip and the first side wall-defining panel define together a slot to receive a respective corner of the closure flap.

The invention provides a blank for a protective holder, the blank being made of shape-retaining material. This blank is generally a paper product,

preferably corrugated fibre board. However, other materials, including multi-wall materials, may be used - typically plastics sheets such as that known by the trade name "CORREX". A preferred material, though, is a single-wall "B" flute corrugated fibre board material made from recycled materials, although it will be understood that the fluting media used may vary depending on the nature of the product to be packaged and the strength required in the holder. Indeed, whilst numerous other materials and combinations of fluting medium could be utilised, the material known by the trade name "TEST" is particularly preferable since it is made from recycled material and is therefore inherently weaker than a pure kraft (virgin), construction. This is a desirable feature, as a holder made therefrom, when assembled and subjected to mechanical shocks, affords much greater resilience (cushion factor) and energy-absorbing characteristics.

Where the material used for the blank of the invention is fluted board, the fluting is preferably aligned generally at right-angles to the first and second fold lines (and thus aligned parallel with the blank edges and any reinforcing strips). This gives increased shock-absorbing and inherent strength properties to the holder made therefrom.

The blank has a central section in which there are panels defining first and second opposed side walls of the holder, between which, and defined by first and second fold lines, is an end wall of the holder. It also has a closure flap projecting beyond the second side wall-defining panel and spaced therefrom by another fold line. Each of these fold lines is arcuate, the sense of the arc - bowed in or bowed out - being such that the end wall and the closure flap are generally

correspondingly elliptical. It is this which causes the holder erected from the blank to take on the desired pillow shape that more or less matches the natural shape of the liquid-containing bag to be disposed therein. There is little else that can be said about the fold lines and their arcuate nature, save to observe firstly that it may be convenient, depending on the material from which the blank is made, to perforate the fold lines (both to render easier the folding of the blank, and to make the resulting holder crumple, and so absorb shock, more readily), and secondly that in general the degree of arc will be small, else it may be difficult to fold the blank properly. Thus, the arcuate nature of the fold lines defining the elliptical end walls is preferably such that the centre point heights of the fold lines are generally in a ratio of centre point height:outer limit of the walls of 100:1 or less, so that the residual inflatability of a bag held therebetween is set at optimum performance to dissipate maximum "hydraulic shock". A preferred range is from 4:1 down to 1.5:1, and in one example the ratio is 2:1. It might also be worth observing that the greater the degree of arc the more the erected holder will be "waisted" as well as "rounded".

In the more preferred embodiment of the blank of the invention there are first and second opposed side walls alongside of which are first and second reinforcing strips. These strips fold over, in the blank's erected form, to provide cuff-like members at the open ends of the thus-produced sleeve-like holder, and these cuffs afford the holder with extra end strength. In fact it is convenient - and provides greater strength - if these reinforcing strips are "doubled", the blank additionally including third and fourth outer reinforcing strips joined to the first and

second reinforcing strips respectively at third and fourth fold lines extending longitudinally of the blank, wherein in the folded configuration of the blank these third and fourth outer reinforcing strips are folded about the third and fourth fold lines into contact with the outwardly facing surface of the first and second reinforcing strips - the combinations of side wall panels, first and second (inner) reinforcing strips and third and fourth (outer) reinforcing strips then having a Z-configuration when the blank is folded to form the holder.

The invention's blank has a central section having panels defining first and second opposed side walls spaced by first and second fold lines from an end wall-defining panel. Most preferably the blank also includes a second end wall-defining panel opposite the first one. This second end-wall panel may be thought of as that part of the closure flap-defining panel inboard of the free edge thereof, and thus as being positioned between the second side wall-defining panel and the closure flap-defining panel and joined thereto either side thereof by respective sixth and seventh fold lines. The fold line between the second end wall-defining panel and the adjacent second side wall-defining panel is, of course, the "other" fold line referred to hereinbefore, and is arcuate. Since the second end wall-defining panel is of the same shape as the first end wall-defining panel, the seventh fold line, between the second end wall-defining panel and the closure-flap-proper part of the closure-flap defining panel, is also arcuate in shape, so that both end wall-defining panels are substantially elliptical (and the blank folds to make a holder with the required pillow shape).

To match this elliptical end-wall shape, the first and third reinforcing strips on the one hand, and the

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second and fourth reinforcing strips on the other hand, each preferably have a central region of truncated rhombic form defined by extensions of the first and second fold lines, whereby the central region is folded into register with the adjacent end of the elliptical first mentioned end wall-defining panel of the blank in the erected configuration of the holder.

The closure member is desirably held in place, to keep the holder shut and its pouch/bag contents secure therein. This holding in place may be achieved in any suitable way, and one such might be to provide the closure flap with a tongue that can fit into a corresponding slot in the relevant side wall. However, in the preferred, reinforcing-strip, form of the blank of the invention the holding is done in another manner. Thus, when the blank is folded into a holder-forming configuration, each of the first and second reinforcing strips is folded over into contact with the exterior of the first and second side wall-defining panels and of the end wall-defining panel, and at one end of each reinforcing strip the reinforcing strip and the first side wall-defining panel define together a slot to receive a respective corner of the closure flap. Most preferably, this closure flap-defining panel defines square corners remote from the second wall-defining panel of the blank, wherein at these square corners there are diagonally-extending fold lines to define the hypotenuses of respective right-angled triangular locking tabs of the closure flap. Then, in the erected configuration of the holder, these locking flaps can be inserted between the first wall-defining panel and the adjacent ends of the respective first and second reinforcing strips only after partial bending of the closure flap along the diagonal fold lines to displace the locking tabs so as to bring the right-angled corners

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closer to one another to permit the insertion of the closure flap.

The holder of the invention - that is, the holder made from the blank of the invention - is, as explained previously, primarily intended to be an outer, protective holder for a bag - specifically, a pouch/bag combination - of some liquid or gel substance. The invention therefore naturally extends to the conglomerate of a holder of the invention when including interposed between the first and second side walls a bag - specifically, a pouch/bag - containing such a liquid or gel. This bag may conveniently have at one end a longitudinally-extending flap defining a handle which projects outwardly of the erected holder when the bag is disposed therein. It will also very preferably incorporate a tear nick or strip, whereby it may be opened (by the User) without the need for there to be employed any cutting tool. Moreover, the bag advantageously has a shape matching that of the outer holder - thus, a waisted shape which is congruent to the preferred waisted shape of the second side wall-defining panel (such a shape is normally natural to a bag made from what is in effect a pair of flexible oblong sheets joined face to face all round their periphery and containing a liquid or gel).

Perhaps slightly surprisingly, a number of pouch/bag-filled blank-derived holders of the invention can be quite conveniently stacked side to side in a relatively stable and safe manner, without significant risk of the pouches rupturing. There seem to be two main reasons for this. Firstly, in the stack the adjacent conglomerates lie major face to major face but the contact between them is not full face but rather

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along a line where each curved pillow surface touches the next. This allows the stack to absorb applied mechanical shock energy both by the individual conglomerates rocking back and forth, and by them flattening out and distorting slightly. Secondly, in the case of the preferred embodiment with the sleeve-end cuffs, these cuffs act both to stabilise the conglomerates against too much rocking and also, the cuffs being themselves resilient and spring-like, to absorb even more of any applied energy.

A stack of this kind can then be contained within a larger, conventional shipping carton (made from corrugated fibreboard, say), again for storage or transport, with a reduced or even zero risk of any of the individual component's contents being damaged if the larger carton is dropped. In this connection it is noted that a number of conglomerates of pouches, bags and holders of the invention, both in and out of larger shipping cartons (these latter held eight filled holders), were tested for Drop Strength according to the standard UN Drop Tests (see Martin Castle's *The Transport of Dangerous Goods*, Revised Addition published by PIRA International in 1995). The filled cartons were dropped from various heights (up to about 1.2m, at which height the UN Drop Tests are effected) at various temperatures (down to -23°C) and in several orientations (flat on, edge on, corner on, etc) onto a hard surface. There were no failures.

For the sake of completeness it is here noted that the invention provides, in its preferred form, a blank from which may be formed a protective holder, the blank being made of shape-retaining material and comprising a central section having panels defining

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first and second opposed side walls of the holder, with, spaced therebetween by arcuate first and second fold lines, an end wall of the holder, a closure flap projecting beyond the second side wall-defining panel and spaced therefrom by another arcuate fold line, and first and second reinforcing strips extending along the edges of the blank in register with the first and second side wall-defining panels and with the end wall-defining panel, which blank may be folded into a pillow-shaped holder-forming configuration wherein each reinforcing strip is folded over into contact with the exterior of the first and second side wall-defining panels and of the end wall-defining panel, and at one end of each reinforcing strip the reinforcing strip and the first side wall-defining panel define together a slot to receive a respective corner of the closure flap.

The invention also provides, in its preferred form, a protective holder made from a blank as just defined. Such a holder affords multi-directional energy-absorbing impact properties, particularly at temperatures below zero.

The invention is now described, though by way of illustration only, with reference to the accompanying Drawings, in which:-

Figure 1 shows a blank according to the present invention and capable of being used to form a single "wrap-around" outer "storage-box" container, or holder, unit of the invention;

Figure 2 shows a perspective view of the blank, partially folded (nearly into the form of a "wrap-around" holder unit of the invention), before insertion of the water-soluble primary pouch/water-protective bag combination, and before final erection;

Figure 3 shows the fully-formed and erected holder unit according to the invention in its locked-together configuration;

Figure 4 shows how the assembled "wrap-around" holder units stack one on top of the other; and

Figure 5 shows an overhead view of the package in laid flat configuration, and shows the integral handle flap of the water-protective bag.

The "wrap-around" holder unit, or outer part, shown in Figures 2 (partially folded) and 3 (fully folded) may be formed from the single blank (generally 1) shown in Figure 1. The blank 1 comprises a central substantially-rectangular portion comprising a first

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side wall region (2) separated from a second side wall region (4) by a generally elliptical first end region (6) bounded by respective substantially elliptical fold lines (8,10).

The end of the second side wall region 4 remote from the first end region 6 lies contiguous to a further elliptical end portion (12) defined by respective curved fold lines (14,16). Beyond this second end region 12 is a closure flap (18) having, at its opposite ends, respective locking tabs (20) of right-angled triangular form with the hypotenuse of the triangle defined by a respective fold line (22).

Lying along the lateral margins of the central region 2,6,4,12 of the blank 1 are inner margin strips (24) and outer margin strips (26) such that the inner margin strips 24 are joined to the central region 2,6,4 of the blank by respective fold lines (28) and are joined to the respective outer margin strips 26 by further fold lines (30). The fold lines 28,30 may conveniently be perforated, to provide improved shock-absorbing properties and to allow the blank to be more easily assembled.

Extending each end of the arcuate fold lines 8,10 defining the elliptical first end region 6 are further fold lines (9 and 11 respectively), defining external reinforcement regions (32) of truncated rhombic form.

The fluting of any board stock used for the blank is preferably aligned from left to right as viewed in Figure 1, i.e. longitudinally of the central panel region 2,6,4,12,18, and parallel to the fold lines 28,30. As noted, this gives increased shock-absorbing and inherent strength properties to the holder unit.

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The blank 1 of Figure 1 is erected to form the holder shown in Figure 3 by the following operations:-

- (i) Firstly, the inner marginal strips 24 are folded under the central panel region 2,6,4 (about the fold lines 28), and the outer marginal strips 26 are then folded back about the fold lines 30 to bring them substantially in contact with the inner marginal strips, thereby forming a Z-fold reinforcement under the respective margin of the central panel region 2,6,4.

To achieve this configuration the outer lateral strips may first be folded about the fold lines 30 and the inner lateral strips 24 then folded about the fold line 28, or the inner lateral strips may first be folded about the fold line 28 and the outer lateral strips 26 then be folded about the fold lines 30, or this Z-fold may be made in one operation.

- (ii) Next, the blank is folded about one or both of the continuous fold lines 8-9, 10-11 bisecting the central panel region 2,6,4 in Figure 1 so that the partially-erected configuration shown in Figure 2 is arrived at.

Where the secondary unit is to enclose a primary package in the form of a flat pouch/bag containing a liquid or a gel, that pouch/bag is inserted between the side panels 2 and 4 in Figure 2.

Finally, the package is then completed by closing the holder unit, which involves firstly bending the triangular locking tabs 20 about their hypotenuse fold lines 22 in order to reduce the spacing between the right angled corners of the two tabs, and then introducing these right angled corners

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between the respective inner marginal strip 24 and the side panel portion 2. The rigidity of the cardboard material, and the geometric lock formed by the truncated rhombic region 32, will ensure that the two locking tabs 20 will be frictionally held in place between the inner lateral strips 24 and the side panel 2.

Furthermore, folding about the two curved fold lines 14,16 to define the substantially elliptical end region 12 will give what was the open end of the holder unit the same elliptical (pillow) configuration which the opposite or floor end of the holder has.

At this stage the configuration of Figure 1 will have been attained.

The outer holder unit of the complete package is shown in Figure 3, and is generally in the form of an elliptical prism. A generally flat primary pouch/bag containing a liquid product (see Fig. 5) can readily be enclosed within this holder unit, and is then totally enclosed therewithin in such a way that it is protected from the effects of external shock.

Figure 4 shows the arrangement when two of the thus closed holder units (i.e. each as shown as in Figure 3) are stacked one on top of the other. They provide a stable stack of the individual reinforced and shock-proof packages comprising the holder unit of Figure 3 and the enclosed primary pouch/bag and liquid or gel product.

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If desired, the primary container bag may have an extension handle portion (34) (see Figure 5) which projects laterally from the closed secondary, i.e. out through either the left-hand side or the right-hand side as viewed in Figure 3. This enables the package to be carried. Alternatively, it would be possible to carry the package by slipping the fingers under the closure flap 18 of Figure 3, relying on the locking effect due to the inherent rigidity of the blank 1 to keep the pack closed and able to bear the weight of the product by holding in this way.

A feature of the invention is that the flexible pouch/bag is securely restrained within the holder unit in what is for the pouch/bag essentially a laid-flat position. Accordingly, no matter how the holder is handled or laid down, "wrinkling" of the inner water soluble primary packaging pouch is virtually eliminated.

Another feature of the invention is that, with the pouch/bag restrained in the manner described, the arrangement allows the residual inflatability of the primary pouch/bag optimum freedom to dissipate an impulse shock over a longer time. As explained below, this is advantageous. In contrast, were the primary bag to be unrestrained, the liquid or gel would find its own level and the remaining air space of the pouch would relax into a non-planar format, which might cause a fold and thus a potential weakness were shock to be applied to such a configuration.

When the primary bag is in the flat, restrained position and carried by the handle 34 the bag cannot be accidentally pulled out of the holder unit. This is due to the fact that, in finding its own level, the liquid within the pouch/bag combination compresses the bag

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material against the side wall construction of the "wrap-around" holder unit, the friction therebetween making a natural constraint. To remove the primary bag the holder is inverted (bag handle down), and, by grasping the handle, the bag is pulled out for use against the friction; the inversion process, aided by the weight of the liquid or gel travelling to the bottom end of the bag 33, makes complete or partial removal of the bag a controlled procedure.

It is important to understand at this stage that the invention can provide a stand-alone pack where the "wrap-around" holder units do not need a specific design of external protection - that is, a number of them do not need to be stored within some larger box such as a shipping carton (although that is, of course, quite possible). This is because the energy-absorbing crumple zones formed by the reinforcing strips allow the pack, even when filled with a 1 litre bag of product, to be dropped from as much as 1.2m and yet withstand the impact at any angle or face. This is made possible by the unique design of the pack in erection of the blank and by the way the primary bag is supported therewithin. The bag is supported both by clamping at both ends and by the locking tabs 20. The end panels, which have a reverse tuck 32 at each end when folded over, are under tension, and act as a buffer zone to absorb shock. They also act as a stacking medium that takes the stacking weight away from the product (as shown in Figure 5).

In the embodiment shown here, the curved end walls are such that the centre point heights of the fold lines 8,10,14,16 are in a 2:1 ratio of centre point height:outer limit of the walls.

Furthermore, the shape of the side walls so far described means that only the reinforced buffer "end"

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fittings 32 will be subjected to most of the energy in any impact imparted. The end crumple zones are therefore designed not only to provide stacking strength but also to provide localised shock protection. The elliptical design of the side panels with the fluting running in the longitudinal (vertical) direction allows for considerable stacking strength.

When a liquid-containing primary bag is placed within the blank-derived outer "wrap-around" holder unit of the invention, no single side wall of the bag is totally in contact with any side wall of the holder unit. Such localisation of shock has the advantage of dividing the potential energy of the bag into localised shock-absorbing zones. Moreover, the holder's resistance to the effects of a bottom drop (which, in practice in the field, when the pack is being carried by the inner handle by the user, is the most likely drop to take place) is high. The marginal strips 24,26 of the side walls forming the "wrap-around" are provided with fluting running along the length of the side wall. These flaps are protruding, and in the event of the holder being subjected to a "base drop" are the first impact zone of the holder. This is advantageous, because the lengthways fluting is considerably weaker than vertical fluting, and will collapse rapidly on impact, thus acting as a sacrificial buffer before coming to rest on the two inner foldover sections, which afford considerably more strength.

CLAIMS

1. A blank from which may be formed a protective holder, the blank being made of shape-retaining material and comprising a central section having panels defining first and second opposed side walls of the holder, with,
spaced therebetween by first and second fold lines, an end wall of the holder, and
a closure flap projecting beyond the second side wall-defining panel and spaced therefrom by another fold line,
the first and second fold lines, and said other fold line, all being arcuate, such that the end wall and the closure flap are generally correspondingly elliptical,
which blank may be folded into a roughly pillow-shaped holder-forming configuration.

2. A blank as claimed in Claim 1, wherein the fold lines defining the elliptical end walls are perforate.

3. A blank as claimed in either of the preceding Claims, wherein the arcuate nature of the fold lines defining the elliptical end walls is such that the centre point heights of the fold lines are in a ratio of centre point height:outer limit of the walls of 100:1 or less.

4. A blank as claimed in any of the preceding Claims, which also has first and second reinforcing strips extending along the edges of the blank in register with the first and second side wall-defining panels and with the end wall-defining panel, such that the blank may be

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folded into a holder-forming configuration wherein each reinforcing strip is folded over into contact with the exterior of the first and second side wall-defining panels and of the end wall-defining panel, and at one end of each reinforcing strip the reinforcing strip and the first side wall-defining panel define together a slot to receive a respective corner of the closure flap.

5. A blank as claimed in Claim 4, which additionally includes third and fourth outer reinforcing strips joined to the first and second reinforcing strips respectively at third and fourth fold lines extending longitudinally of the blank, such that in the folded configuration of the blank to form the holder therefrom the third and fourth outer reinforcing strips may be folded about the third and fourth fold lines into contact with the outwardly facing surface of the first and second reinforcing strips.

6. A blank as claimed in Claim 5, wherein the first reinforcing strip and the third outer reinforcing strip, on the one hand, and the second reinforcing strip and the fourth outer reinforcing strip, on the other hand, each have a central region of truncated rhombic form defined by extensions of the first and second fold lines, whereby the central region can be folded into register with the adjacent end of the elliptical first-mentioned end wall-defining panel of the blank in the erected configuration of the holder.

7. A blank as claimed in any of Claims 4 to 6, wherein the closure flap-defining panel defines square corners remote from the second wall-defining panel of the blank, and wherein at each square corner there is a diagonally-extending fold line to define the hypotenuse of a right-angled triangular locking tab of the closure flap, such that when the blank is formed into the erected holder

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configuration the locking flaps can be inserted between the first wall-defining panel and the adjacent ends of the respective first and second reinforcing strips only after partial bending of each closure flap along its diagonal fold lines to displace the locking tabs so as to bring the right-angled corners closer to one another to permit the insertion of the closure flap.

8. A blank as claimed in any of the preceding Claims, which additionally includes a second substantially elliptical end wall-defining panel between the second side wall-defining panel and the closure flap-defining panel and joined thereto by respective sixth and seventh arcuate fold lines and matching the shape of the first end wall-defining panel.

9. A blank as claimed in any of the preceding Claims and formed from corrugated fibre board.

10. A blank as claimed in Claim 9, wherein the corrugated fibre board is a single wall board with the corrugations throughout the blank extending parallel to the first and second fold lines separating the first-mentioned reinforcing strips from the first and second side wall-defining panels.

11. A blank as claimed in any of the preceding Claims and substantially as described hereinbefore.

12. A protective holder made from a blank as claimed in any of the preceding Claims.

13. A holder as claimed in Claim 12 and including interposed between the first and second side walls of the erected holder a water-protective bag within which is a water-soluble plastic pouch containing a liquid or a gel.

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14. A holder as claimed in Claim 13, wherein the bag has at one end a longitudinally extending flap defining a handle which projects outwardly of the erected holder.

15. A holder as claimed in any of Claims 12 to 14, wherein the bag has a waisted shape which is congruent to the waisted shape of the side wall-defining panels.

16. A holder as claimed in any of Claims 12 to 15 and substantially as described hereinbefore.

AMENDED CLAIMS

[received by the International Bureau on 18 December 1997 (18.12.97);
original claims 1 - 16 replaced by amended claims 1 - 14 (4 pages)]

1. A blank from which may be formed a protective holder, the blank being made of shape-retaining material and comprising a central section having panels defining first and second opposed side walls of the holder, with,
 - spaced therebetween by first and second fold lines, an end wall of the holder, and
 - a closure flap projecting beyond the second side wall-defining panel and spaced therefrom by another fold line,
 - the first and second fold lines, and said other fold line, all being arcuate, such that the end wall and the closure flap are generally correspondingly elliptical,
 - which blank may be folded into a roughly pillow-shaped holder-forming configuration,
 - which blank also has first and second reinforcing strips extending along the edges of the blank in register with the first and second side wall-defining panels and with the end wall-defining panel, such that the blank may be folded into a holder-forming configuration wherein each reinforcing strip is folded over into contact with the exterior of the first and second side wall-defining panels and of the end wall-defining panel, and at one end of each reinforcing strip the reinforcing strip and the first side wall-defining panel define together a slot to receive a respective corner of the closure flap,
 - which blank additionally includes third and fourth outer reinforcing strips joined to the first and second reinforcing strips respectively at third and fourth fold

lines extending longitudinally of the blank, such that in the folded configuration of the blank to form the holder therefrom the third and fourth outer reinforcing strips may be folded about the third and fourth fold lines into contact with the outwardly facing surface of the first and second reinforcing strips.

2. A blank as claimed in Claim 1, wherein the fold lines defining the elliptical end walls are perforate.

3. A blank as claimed in either of the preceding Claims, wherein the arcuate nature of the fold lines defining the elliptical end walls is such that the centre point heights of the fold lines are in a ratio of centre point height:outer limit of the walls of 100:1 or less.

4. A blank as claimed in any of the preceding Claims, wherein the first reinforcing strip and the third outer reinforcing strip, on the one hand, and the second reinforcing strip and the fourth outer reinforcing strip, on the other hand, each have a central region of truncated rhombic form defined by extensions of the first and second fold lines, whereby the central region can be folded into register with the adjacent end of the elliptical first-mentioned end wall-defining panel of the blank in the erected configuration of the holder.

5. A blank as claimed in any of the preceding Claims, wherein the closure flap-defining panel defines square corners remote from the second wall-defining panel of the blank, and wherein at each square corner there is a diagonally-extending fold line to define the hypotenuse of a right-angled triangular locking tab of the closure flap, such that when the blank is formed into the erected holder configuration the locking flaps can be

inserted between the first wall-defining panel and the adjacent ends of the respective first and second reinforcing strips only after partial bending of each closure flap along its diagonal fold lines to displace the locking tabs so as to bring the right-angled corners closer to one another to permit the insertion of the closure flap.

6. A blank as claimed in any of the preceding Claims, which additionally includes a second substantially elliptical end wall-defining panel between the second side wall-defining panel and the closure flap-defining panel and joined thereto by respective sixth and seventh arcuate fold lines and matching the shape of the first end wall-defining panel.

7. A blank as claimed in any of the preceding Claims and formed from corrugated fibre board.

8. A blank as claimed in Claim 7, wherein the corrugated fibre board is a single wall board with the corrugations throughout the blank extending parallel to the first and second fold lines separating the first-mentioned reinforcing strips from the first and second side wall-defining panels.

9. A blank as claimed in any of the preceding Claims and substantially as described hereinbefore.

10. A protective holder made from a blank as claimed in any of the preceding Claims.

11. A holder as claimed in Claim 10 and including interposed between the first and second side walls of the erected holder a water-protective bag within which is a water-soluble plastic pouch containing a liquid or a gel.

12. A holder as claimed in Claim 11, wherein the bag has at one end a longitudinally extending flap defining a handle which projects outwardly of the erected holder.
13. A holder as claimed in any of Claims 10 to 12, wherein the bag has a waisted shape which is congruent to the waisted shape of the side wall-defining panels.
14. A holder as claimed in any of Claims 10 to 13 and substantially as described hereinbefore.

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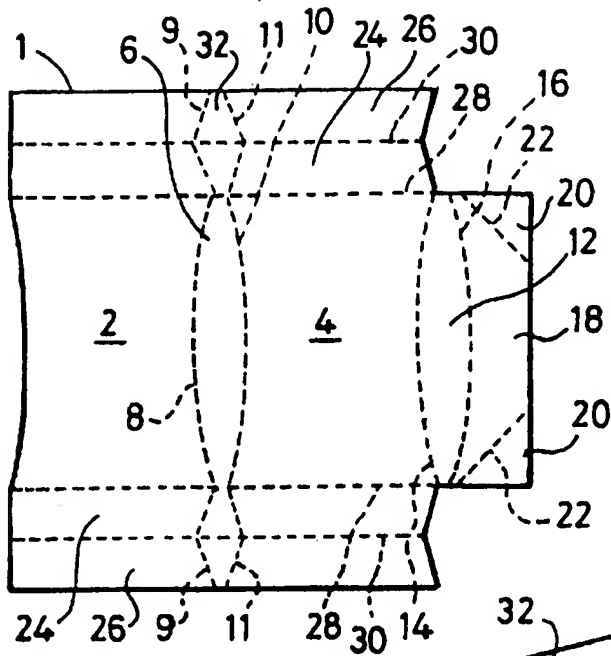


Fig. 1

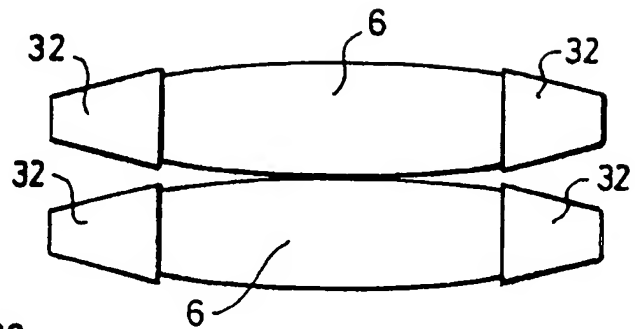


Fig. 4

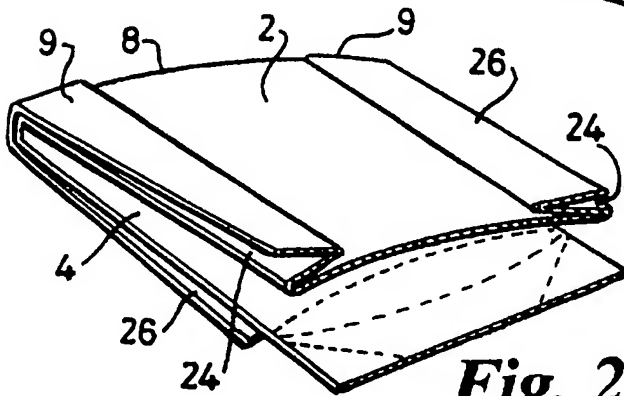


Fig. 2

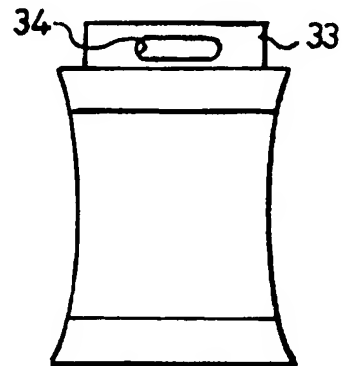


Fig. 5

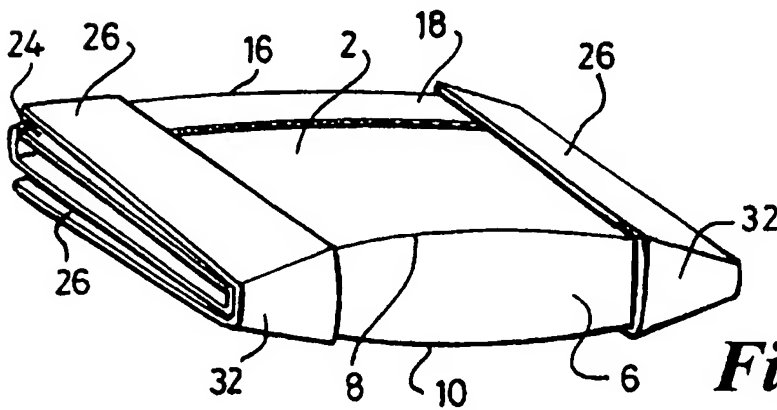


Fig. 3